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ABSTRACT

Changes in verbalized inquiry behavior of teachers and students who participated in the Mid-Continent Regional Educational Laboratory's Instructional Staff Development program in inquiry were identified. Teachers' verbal behaviors were analyzed in terms of their teaching strategies as related to three inquiry models. An expanded modification of the Flanders' Interaction Analysis Instrument with 34 subcategories was developed and utilized for data collection. Teachers in the program became more indirect in their influence patterns while still leading the inquiry sessions. Pre and posttests resulted in an increase in the number of specific inquiry behaviors and affective areas identified. This reflects a greater understanding of behaviors related to student-centered, inquiry-oriented instruction. As a group, teachers showed a decrease in teacher talk while students exhibited an increase from a pretest of 17.5 to a posttest of 33.5. Teachers also increased their knowledge and application skills on interaction analysis from a mean score of 4.5 to 14.4 out of a possible 19 points on a prepost test. (Author)

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AN ANALYSIS OF TEACHER VERBAL BEHAVIOR BEFORE AND AFTER PARTICIPATION IN THE McREL INSTRUCTIONAL STAFF DEVELOPMENT PROGRAM

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by

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An Analysis of Teacher Verbal Behavior Before and After Participation in the McREL Instructional Staff Development Program

Introduction

A great deal of attention has been focused on inquiry learning in the past decade. A large variety of curricular materials have been designed to promote inquiry learning. In addition, support for incorporation of the inquiry process as well as factual content has been especially strong. However, teaching behavior too often remained unchanged from the approaches of the more traditional classroom.

It was this concern along with parallel forces in teacher education to increase the variety of skills possessed by teachers that led to the development of the Instructional Staff Development program in inquiry (ISD). The University of Nebraska Teachers College, Lincoln, in cooperation with the Mid-Continent Regional Educational Laboratory, (McREL), Kansas City, conceptualized, developed and tested a staff development program designed for experienced teachers who were interested in improving inquiry learning in their classrooms.[1] The Instructional Staff Development program (ISD) initially focuses on developing an awareness of teaching behaviors and on self-analysis and self-assessment skills. Teachers then concentrate on behaviors and techniques for promoting inquiry learning behaviors on the part of students. The inquiry behaviors are identified as; (1) verbal influence behaviors,

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[1]The Paper, "Design for an Effective Staff Development Program," by Alan T. Seagren presented at the 1974 Annual Meeting of AERA provides an overview of the design and implementation of this program.

(2) cognitive inquiry behaviors[2], and (3) affective inquiry behaviors.[3] The purpose of this paper is to identify changes in verbal inquiry behavior of teachers and students who participated in the ISD program.

The ISD program proceeds from the frame of reference that it is not only important for a teacher to be able to control his behavior in certain specified ways but it is equally important that the teacher understands and is capable of selecting from a wide range of alternatives the strategy which is most appropriate in terms of the objectives and the type of students with whom he is attempting to communicate and relate. The intent was that teachers must have an understanding of the total context within which specific strategies function in order to be more than a technician and to be responsive to feedback and input from students in terms of the objectives when making decisions and selecting alternate strategies.

Staff development programs for teachers usually concentrate on the teaching process or the curriculum to be taught or both elements. In the ISD program the emphasis was primarily on the process of teaching with curriculum considerations entering only in Component IV. This was not to suggest that the development of curriculum materials and the study of new content is not important, but it does recognize the belief that individual staff development programs must focus on one major aspect of teaching to be successful. Evidence from the past curriculum innovations in terms of curriculum are contingent upon the teachers' ability to control and modify their behaviors so as it is

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[2]The Paper, "An Analysis of Teacher and Student Verbalization of Cognitive Inquiry Behaviors Before and After Participation in the McREL and ISD Program" by Delivee Wright presented at the 1974 Annual Meeting AERA reports this aspect of the ISD program.

[3]The Paper, "Developing/Identifying Student Affective Behaviors," by John E. Lux presented at the 1974 Annual Meeting of AERA reports this aspect of the ISD Program.

congruent with: (1) the intent of the material being utilized, (2) the theory behind the materials, and (3) the activities designed to accomplish the major objectives of the curriculum. The ISD program emphasized the process of teaching and focused on influence patterns, inquiry skills, structuring and organizational skills, inquiry strategies, inquiry phases, inquiry planning, and affective behaviors.

The ISD program attempted to help a teacher recognize what he was doing and how his behaviors might be modified to improve learning. The program recognized that many teachers have had little or no experience in inquiry teaching and that their style of teaching is normally of an expository nature. This program was designed to assist teachers to modify their instructional behavior moving step by step from the non-inquiry expository strategies of lecture and recitation into the teacher directed inquiry strategies of Teacher Directed Inquiry and toward Student Directed Inquiry and finally to Pupil Centered Inquiry.

Population and Procedures

Twenty experienced classroom teachers from the Lincoln and Omaha, Nebraska secondary schools were selected to participate in the study based upon their interest in participating in the ISD program. These teachers represented a variety of subject matter areas (biology, English, music, health, mathematics, social studies, business and French).

The instructional treatment included six components or units of study conducted by four trainers. The trainers were selected from individuals trained in a summer workshop conducted on the University of Nebraska-Lincoln campus to implement the ISD program. The trainers selected were certified as meeting all competencies for a trainer on the basis of performance in

the summer workshop. The four trainers worked with the twenty classroom teachers applying the ISD program in accordance with the ISD Trainers Manual[4] for each component. They carried out written assignments and provided feedback to participating teachers as prescribed in the program materials. Each participating teacher used a copy of the ISD Handout Materials[5] and trainers were instructed to follow the sequence of activities in the Trainers Manual but they had the option of adjusting time allotments or emphasis on the basis of their assessments of their participating teachers readiness. Each trainer conducted approximately fifteen instructional sessions.

Each participating teacher micro-taught five times. Instructional topics of the six components included Orientation to Inquiry, Verbal Influence Behaviors, Inquiry Skills, Behavioral Objectives, Pupil Centered Inquiry, and Affective Behaviors that Promote Inquiry.

Data Collection

Each of the twenty participating teachers were videotaped in one randomly selected class before participating in the ISD program (Pre I) and the same class was videotaped after instruction in Components III, IV, and VI. Teacher and student verbal behaviors were coded with the instrument, "Inquiry Analysis System",[6] which is an expanded Flanders Interaction Analysis instrument with thirty-four sub categories providing data on inquiry behaviors. (See Table 1).

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[4]Instructional Staff Development: Trainer's Manual. University of Nebraska-Lincoln and Mid-Continent Regional Educational Laboratory, Kansas City, Missouri, June 1971.

[5]Instructional Staff Development: Handout Materials. University of Nebraska-Lincoln and Mid-Continent Regional Educational Laboratory, Kansas City, Missouri, June 1971.

[6]Alan T. Seagren, et. al., Instructional Staff Development: Component Three, Inquiry Behavior, Kansas City, Missouri: Mid-Continent Regional Educational Laboratory, 1972.

Data were collected with trained coders on the three second interval with the instrument for each of the videotaped classes. Coder reliability in the use of the IAS instrument was determined through the application of Scott's Coefficient of Reliability with a percentage of above 80 per cent considered an acceptable level of consistency. The reliabilities are shown in the following chart.

IA and IAS Coder Reliabilities

	Major Ten Categories of IA			
	Pre I	Post III	Post IV	Post VI
A. Inter-reliability	86.0%	89.6%	86.4%	86.4%
B. Intra-reliability				
coder 1	100.0%	88.1%	88.4%	86.8%
coder 2	86.0%	93.7%	82.5%	94.8%

	34 Sub Categories of IAS			
A. Inter-reliability	82.2%	89.2%	81.7%	85.9%
B. Intra-reliability				
coder 1	100.0%	84.4%	81.1%	85.1%
coder 2	82.2%	91.0%	94.0%	95.9%

Description of the Instrument

The Inquiry Analysis System is an observational instrument designed to record the verbal behavior of the teacher and students in the classroom. It uses the basic ten categories of Flanders Interaction Analysis and expands them by using 34 sub-categories (see Table 1 that follows for instrument).

Table 1 - INQUIRY ANALYSIS SYSTEM *

Category 1 - Accepting Feelings

Category 2 - Reinforcement
- 2a - Positive reinforcement of student of class
- 2h - Humor

Category 3 - Feedback
- 3b - Building on student response
- 3r - Repeating student response
- 3q - Refers student response to students
- 3s - Teacher verbally recognizes that student wishes to speak

Category 4 - Questioning
- 4c - Concept identification
- 4a - Data analysis
- 4d - Decision making
- 4v - Affective domain
- 4s - Structure or process

Category 5 - Information Giving
- 5l - Lecture
- 5v - Visual as well as verbal presentation
- 5x - Answers student question

Category 6 - Giving Directions
- 6d - Directions
- 6m - Emphasizing or calling attention to main points
- 6s - Directs a student to respond (directed to respond, not volunte

Category 7 - Criticizes or Justifies Authority
- 7c - Criticizes student or class
- 7n - Negative reinforcement

Category 8 - Directed Student Talk
- 8c - Content reply to teacher's question
- 8a - Analysis reply to teacher's question
- 8d - Decision stated in reply to teacher's question
- 8v - Attitude or value stated (rather than content expressed)
- 8q - Student asks question in reply to teacher's question
- 8n - Student states that he does not know or does not wish to answer

Category 9 - Self-Initiated Student Talk
- 9c - Student initiates content (factual) information
- 9d - Decision or conclusion stated by student
- 9v - Student initiates attitude or value
- 9q - Student asks question about topic or process
- 9a - Student analyzes information
- 9n - Disruptive comment

Category 10 - Other Behaviors Related to Dialogue
- 10c - Confusion
- 10s - Silence

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* Alan T. Seagren, et.al., Instructional Staff Development: Corrorant Three. Inquiry Behavior, Kansas City: Mid-Continent Regional Educational Laboratory, 1972.

The first seven categories dealt with teacher talk while categories eight and nine provided data on student verbal behavior. Category ten was other behavior related to dialogue. When this instrument was applied, appropriate symbols were recorded every three seconds or with every behavior change, whichever occurred first. For example, if the teacher asked a content question the coder recorded a 4c. If the student answered that question with an analysis level reply, it would be recorded as an 8a.

Research Design

The design employed was a one-factor experiment with repeated measures. In this design, the data are analyzed as in a two-way classification with one observation per cell. Subjects constituted a random variable and the treatments are viewed as fixed. The model is then a mixed model with N=1. Since there were eleven dependent variables of interest, a one-factor multivariate analysis of variance was used with the residual as the error term. A multivariate analysis of variance computerized program was used to run the test of significance of change in observed behavior.[7]

[7] Program Version 5.1, National Educational Resources, Inc., Ann Arbor: Michigan, 1972.

Hypotheses

The null hypotheses were that there would be no differences in teacher and student verbal behaviors as a result of training in the ISD program. More specificially:

1. There would be no differences in the accepting of feelings by teachers.
2. There would be no differences in the use of reinforcement by teachers.
3. There would be no differences in feedback by teachers.
4. There would be no differences in the use of questioning by teachers.
5. There would be no differences in information giving by teachers.
6. There would be no differences in giving directions by teachers.
7. There would be no differences in criticizing and justifying authority by teachers.
8. There would be no differences in directed student talk.
9. There would be no differences in self-initiated student talk.
10. There would be no differences in other behaviors related to dialogue.
11. There would be no differences in the indirect teacher behavior/ to indirect teacher behavior plus direct teacher behavior (I/I+D Ratio).

Results

Tables II, III, IV, and V present data after re-ordering of the behavior keys (variables) via the Multivariate Analysis of Variance. Table II indicates that variable key 8 (directed student talk) was significant at the .05 level. After instruction in the "ISD" program students increased their directed student talk significantly.

Even more significantly, (at the .001 level), teachers increased their use of feedback (behavioral key 3), Table III presents the analysis via a re-ordering of variables whereby behavioral key 3 (feedback by teachers) is identified as significant.

Table IV shows that via a re-ordering of the variables, that behavioral key 9 (self-initiated student talk) was signficant at the .001 level. Therefore, students had significantly increased the amount of self-initiated student talk after instruction in the "ISD" program.

Table V shows the behavior changes of subjects as compared to each of the data collection intervals. Self-initiated student talk (behavioral key 9) increased significantly at the .001 level at each of the data collection periods. Behavioral key 2, (reinforcement by teacher) was significant at the .001 level at the Post IV and Post VI data collection periods. Feedback by the teacher, (behavioral key 3) was significant at the .01 level after instruction through "component III" of the ISD program. Directed Student Talk, (behavioral key 8) was significant at the .01 level of significance after instruction in "component VI" of the ISD program. Other behaviors related to dialogue, (behavioral key 10) was significant at the .05 level also after instruction in "component VI" of the ISD program.

Table II

BEHAVIOR CHANGES OF SUBJECTS OVER TIME

Variable	Hypothesis Mean Sq.	Univariate F	P Less Than	Step Down F	P Less Than
Behavior Key 1	0.0005	1.0000	0.3996	1.0000	0.3996
Behavior Key 2	59.3625	21.6492	0.0001	21.1836	0.0001
Behavior Key 5	3787.7981	23.0746	0.0001	23.8011	0.0001
Behavior Key 6	59.6488	7.0317	0.0005	4.3694	0.0080
Behavior Key 9	16160.9835	138.9828	0.0001	15.0435	0.0001
Behavior Key 3	417.7661	18.4000	0.0001	3.5998	0.0194
Behavior Key 4	505.3148	16.1020	0.0001	2.9575	0.0410
Behavior Key 7	6.4363	7.0046	0.0005	1.3679	0.2573
Behavior Key 8	430.4835	12.7364	0.0001	3.8491	0.0150 *
Behavior Key 10	238.9505	5.1354	0.0033	2.0275	0.1226
Behavior Key 11	0.2410	7.8139	0.0002	0.0319	0.9923

Degrees of Freedom for Hypothesis = 3

Degrees of Freedom for Error = 57

* Significant at .05 level

Table III

BEHAVIOR CHANGES OF SUBJECTS OVER TIME

Variable	Hypothesis Mean Sq.	Univariate F	P Less Than	Step Down F	P less Than
Behavior Key 8	430.4835	12.7364	0.0001	12.7364	0.0001
Behavior Key 2	59.3625	21.6492	0.0001	12.5148	0.0001
Behavior Key 4	505.3148	16.1020	0.0001	1.1086	0.3535
Behavior Key 9	16160.9835	138.9828	0.0001	68.6078	0.0001
Behavior Key 6	59.6488	7.0317	0.0005	0.1901	0.9027
Behavior Key 5	3787.7981	23.0746	0.0001	0.3843	0.7648
Behavior Key 3	417.7661	18.4000	0.0001	6.1298	0.0010 *
Behavior Key 7	6.4363	7.0046	0.0005	1.0514	0.3781
Behavior Key 1	0.0005	1.0000	0.3996	0.9803	0.4098
Behavior Key 10	238.9505	5.1354	0.0033	2.0275	0.1226
Behavior Key 11	0.2410	7.8139	0.0002	0.0319	0.9923

Degrees of Freedom for Hypothesis = 3

Degrees of Freedom for Error = 57

* Significant at .001 level

Table IV

BEHAVIOR CHANGES OF SUBJECTS OVER TIME

Variable	Hypothesis Mean Sq.	Univariate F	P Less Than	Step Down F	P Less Than
Behavior Key 8	430.4835	12.7364	0.0001	12.7364	0.0001
Behavior Key 3	417.7661	18.4000	0.0001	11.5198	0.0001
Behavior Key 4	505.3148	16.1020	0.0001	1.0018	0.3990
Behavior Key 9	16160.9835	138.8928	0.0001	83.3164	0.0001 *
Behavior Key 6	59.6488	7.0317	0.0005	0.1543	0.9265
Behavior Key 5	3787.7981	23.0746	0.0001	2.5666	0.0644
Behavior Key 2	59.3625	21.6492	0.0001	1.3212	0.2777
Behavior Key 7	6.4365	7.0046	0.0005	1.0514	0.3781
Behavior Key 1	0.0005	1.0000	0.3996	0.9803	0.4098
Behavior Key 10	238.9505	5.1354	0.0033	2.0275	0.1226
Behavior Key 11	0.2410	7.8139	0.0002	0.0319	0.9923

Degrees of Freedom for Hypothesis= 3

Degrees of Freedom for Error = 57

* Significant at .001 level

Table V

BEHAVIOR CHANGES OF SUBJECTS AT EACH TIME INTERVAL OF DATA COLLECTION

Variable	Post III		Post IV		Post VI	
	Step Down F	P Less Than	Step Down F	P Less Than	Step Down F	P Less Than
Reinforcement (2)	3.2014	.0789	16.6872	.0002*	45.0588	.0001*
Self-Initiated Student Talk (9)	22.4780	.0001*	30.0284	.0001*	174.5211	.0001*
Feedback (3)	10.9892	.0017**	3.8630	.0545	1.5516	.2182
Directed Student Talk (8)	0.2193	.6415	0.6888	.4103	9.4085	.0034**
Questioning (4)	0.2794	.5994	0.4304	.5147	1.7656	.1897
Giving Directions (6)	0.0405	.8414	0.2754	.6020	0.0021	.9641
Information Giving (5)	2.7578	.1030	2.6374	.1106	0.0231	.8798
Accepting Feelings (1)	2.5331	.1178	0.0790	.7799	0.1845	.6694
Criticizing/ Just. Authority (7)	2.1433	.1496	0.0036	.9524	1.0192	.3177
Other B ehaviors /dialogue (10)	3.7257	.0596	3.3239	.0746	4.8461	.0326***
I/I+D Ratio	0.0858	.7709	0.0044	.9473	0.0096	.9225

Degrees of Freedom for Hypothesis = 1

Degrees of Freedom for Error = 57

* Significant at .001 level
** Significant at the .01 level
*** Significant at the .05 level

Conclusions

The null hypotheses were rejected on three of the variables as there were significant changes in teacher and student verbal behaviors as a result of training in the ISD program. These were feedback by teachers (category 3), directed student talk (category 8), and self-initiated student talk (category 9). More specificially, the data revealed the following:

1. The null was accepted for behavioral key 1 (accepting feelings by teachers) as there were no significant differences.
2. The null was accepted for behavioral key 2 (reinforcement by teachers) as there were no significant differences.
3. The null was rejected for behavioral key 3 (feedback by teachers), as significant differences at the .001 level were found after instruction.
4. The null was accepted for behavioral key 4 (questioning by teachers) as no significant differences were found.
5. The null was accepted for behavioral key 5 (information giving by teachers) as there were no significant differences.
6. The null was accepted for behavioral key 6 (giving directions by teachers) as there were no significant differences.
7. The null was accepted for behavioral key 7 (criticizing and justifying authority by teachers), as there were no significant differences.
8. The null was rejected for behavioral key 8 (directed student talk), as significant differences at the .05 level were found after instruction.
9. The null was rejected for behavioral key 9 (self-initiated student talk), as significant differences at the .001 level were found after instruction.

10. The null was accepted for behavioral key 10, (other behavior related to dialogue), as no significant differences were found.
11. The null was accepted for behavioral key 11, (indirect teacher behavior /to indirect teacher behavior plus direct teacher behavior), as no significant differences were found.

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